Josephine Draper

From: Eric Whitfield
Sent: Thursday, 21 January 2010 4:21 p.m.
To: Josephine Draper
Subject: FW: Kapiti Strategy Study: Additional Option Assessment
Attachments: Initial Comments on Five Options (WGS 160609).doc

Follow Up Flag: Follow up
Flag Status: Flagged

From: Wayne Stewart [mailto:wayne.stewart@opus.co.nz]
Sent: Wednesday, 17 June 2009 9:44 a.m.
To: JosephineD@TNZ_DOM.WLG-PO; Rob Whight
Cc: Eric Whitfield; DAVID.DUNLOP@OPUS.CO.NZ; ROGER.BURRA@OPUS.CO.NZ
Subject: Kapiti Strategy Study: Additional Option Assessment

Rob and Jo

Following our meeting yesterday, I have formed a small task group to assess the five options that we discussed. To maximise efficiency and to meet the tight timeframe, I have asked Roger to postpone his present work on completing the Kapiti Strategy Study report and to give his attention to this project. We are bringing a SATURN modeller from Auckland to work with our Wellington modelling team to ensure that we can complete the SATURN modelling runs required to provide information for each of the five options. We have also identified team members for preparing graphics and costs estimates needed for the A3 summaries for each option. Roger, David and I will prepare the descriptions and pros and cons for each option. We will cover many of the technical issues, and may attempt to scope out some of the obvious political issues, giving you a draft that you can work from.

We prepared draft sketches for the five options today, for briefing our modellers. This process, together with Jo's brief, reveal that we need to undertake a total of nine SATURN tests. Given the additional resources now added to our modelling team, we are confident that we can complete this in time, although it will have to be at the expense of completing the programmed tests for the Kapiti Strategy Report. As a contingency measure, we prioritised these tests from most important to least important.

At our meeting on Friday, we will go over our understanding of the five options to ensure that we are all on the same page, and the proposed testing schedule. We will also aim to provide a mock up of a A3 page for one of the options.

You indicated that your preference is to recommend Option 4 as the preferred option to the Minister. To assist you in this task, we will prepare technical information about each of the five options - summarised on A3 page. I've made a few notes on the attached document, which summarise what we know already, or what we are likely to find, about the five options. This review highlights that: -

- Option 3 is the easiest to eliminate as it has one or more serious technically flaws.
- Option 1 is not so easy to eliminate from a technical point of view, and we may need to focus on its serious political impediments.
- Options 4 and 5 are the same, the only difference being the staging of construction. Hence both offer the same long term benefits and costs. Both are feasible in terms of staging. To present Option 4 in a better light over Option 5, we will need to check if Option 4 has a better return on its investment. I suspect that our modelling may show that this is may be the case. We may also need to focus on the political impediments of Option 5, noting that Option 4 is more 'spade-ready': meaning we can spend money quicker and build something sooner.
- Option 2 will be difficult to eliminate from a technical point of view. If Option 2 is seen as an interim solution, then it can be seen as being the same as Option 4 and 5. It then becomes a question of staging. In terms of staging, Option 2 is likely to have higher return on investment than both Option 4 and Option 5.

In saying all that, there are likely to be strong positive benefits for also building WLR Stage 1 (section 5) - certainly as a stand alone project. However, if the Minister's focus is on the SH and only building those parts of the WLR to enable SH construction, then it may be difficult to justify WLR Stage 1 (section 5).

Jo, given the work you have already done already, I would like to call you to discuss your views on the question of comparing Options 4 and 5.

Wayne Stewart

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Kapiti Strategy Study

Additional Options and Staging

Notes by Wayne Stewart 16 June 2009

Based on the modelling analysis work completed to date, I make the following observations about the five options that we discussed at the meeting on 16 June 2009. These notes give an insight into the a possible outcome of our more detailed technical investigation - yet to be completed - and highlight how we will need to develop strategies in support the desire to promote Option 4.

Option 1: - SH located on land designated for WLR

The SH located on land designated for WLR (when tested with two minor local roading links – shown on the attached figure), is likely to result in having economic benefits greater than Option 2, but less than Option 4 or 5. This option is also likely to cost the least, as we need to construct one road and not two. Therefore, Option 1 may have the highest BCR of all options. Option 1 may overcome some of the urban form issues that the present WLR designation creates, as development along this designation has already turned its back to the road - turning it into a car orientated through-route and not an attractive or functional arterial. It also means that the SH1 could become a local arterial, allowing the existing access and activity to remain (particularly at Waikanae but also at Kapiti). For this reason, Option 1 is unlikely to create anymore severance than what the present designation creates. Option 1 also has the potential to overcome the intersection capacity problems between the WLR and Kapiti Road, giving higher economic benefits. It is also likely to produce less noise and air pollution (along the WLR corridor) than the other options. These potential technical benefits will need to be weighed against the significant adverse social impacts, property ownership issues and political challenges that the location of a 4 lane expressway through a dense urban area creates. We may also need to obtain a new NOR and consents – meaning no early construction date.

Option 2: - SH expressway completed with minimal local road investment

My feeling is that next to Option 1, Option 2 will have the highest BCR. Work completed to-date confirms that it is not feasible to close the Kapiti Road/SH1 intersection without providing an alternative route for local vehicle movements. It is possible that by providing Stage 3 and Stage 1(s2) of the WLR and providing additional local connections to SH1 at Lindale (by providing a new east-west connection along Ventnor Drive to the existing Lindale interchange) will allow the Kapiti Road and SH1 connection to be closed and hence allowing SH1 to become an expressway.

Option 3: Upgrade of existing SH1 to 4 lanes.

This will have significant negative economic benefits. We can expect any option that upgrades SH1 as an expressway while not also providing for local connections to have negative benefits.

Modelling will show that the negative benefits, associated with local traffic making longer trips because they cannot use the SH, will completely out-weigh the benefits for SH1 through traffic benefiting from the faster expressway. Local trips are disadvantaged because we need to close all connections between SH1 and local roads (except for interchanges at Popular and Otaihanga) in order to provide the expressway. This option creates significant access issues along the SH, requiring an alternative parallel service lane for property access. It requires significant additional land adjacent to the state highway, some of which has high environmental value.

Option 4 and 5: WLR (stages 1 and 3) and also the SH1 expressway (stages G to J) Waikanae to McKays crossing.

Because these options provide both a new local arterial and an upgraded through-route, they are likely to have the highest economic benefits. However because they require more road building than the other options, they will be the most expensive options and therefore can be expected to have a lower BCR than Option 1 and 2. The only difference between these two options is the order of construction. Option 4 focuses first on WLR. Option 5 focuses first on the SH. Both will work. My guess is that Option 4 may have a slightly superior incremental BCR, as it appears to provide higher BCR in the early years.

Timing is the big issue in comparing Option 4 and 5. If we assume that all stages are built at the same time, then they are equal. However, the return on investment will depend on assumptions such as when the various parts are constructed. So timing needs to be considered if we are to draw meaningful conclusions from a return on investment calculation. The first stage and part of the second stage of Option 4 are spade-ready and could be opened within 3 years. In comparisons the first stage of Option 5 would take about 8 to 10 years before it was opened. So we might consider using the earliest possible dates for opening as an indicator for timing. Alternatively, we can set a date when we think the BCR is greater than 1.0 – however I am not sure if having a BCR greater than 1.0 is of concern to the Minister.

So we need to think through a strategy here. We may need to plan for the eventuality that Minister may not be very worried about small differences in return on investment or BCR, but is focused on projects that accelerate the building of SH.

Location Map

Josephine Draper

From: Roger Burra [Roger.Burra@opus.co.nz]
Sent: Tuesday, 8 September 2009 3:58 p.m.
To: Rob Whight
Cc: Eric Whitfield; Josephine Draper
Subject: Kapiti SH1 Upgrade Proposals - Ministerial Question
Attachments: 090908_Travel_Time_Analysis.xls

Importance: High

Hi Rob,

The attached spreadsheet gives the 2026 absolute travel times for Do Minimum (includes all permitted development) Expressway Option - Follows Rail (this is the version which is presented in the consultation brochure) Expressway Option - Avoids Town Centres

The travel time savings presented in Table 7.1 of the technical report are the average of the PM savings for both directions.

Hope this helps

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Forecast year 2026

McKays Crossing and Peka Peka

		AM									IP									PM									
		Actual			Change			Change %			Actual			Change			Change %			Actual			Change			Change %			Comment
		NB	SB	Both	NB	SB	Both	NB	SB	Both	NB	SB	Both	NB	SB	Both	NB	SB	Both	NB	SB	Both	NB	SB	Both	NB	SB	Both	
Donkin	Time (s)	1201	2074	3275							1040	864	1904							1282	1437	2719							On Existing SH1
	Distance (m)	16720	16660	33380							16720	16660	33380							16720	16660	33380							
Expressway Follows Rail (Option 3d - Consultation Version)	Time (s)	600	594	1194	-601	-1480	-2081	-50%	-71%	-64%	600	589	1189	-440	-275	-715	-42%	-32%	-38%	610	589	1199	-672	-848	-1520	-52%	-59%	-56%	SH1 Express way
	Distance (m)	16300	16300	32600	-420	-360	-780	-3%	-2%	-2%	16300	16300	32600	-420	-360	-780	-3%	-2%	-2%	16300	16300	32600	-420	-360	-780	-3%	-2%	-2%	
Expressway Avoids Future Town Centres (Option 4)	Time (s)	654	646	1300	-547	-1428	-1975	-46%	-69%	-60%	654	642	1296	-386	-222	-608	-37%	-26%	-32%	663	642	1305	-619	-795	-1414	-48%	-55%	-52%	SH1 Express way
	Distance (m)	17790	17770	35560	1070	1110	2180	6%	7%	7%	17790	17770	35560	1070	1110	2180	6%	7%	7%	17790	17770	35560	1070	1110	2180	6%	7%	7%	

McKays Crossing and Peka Peka

Forecast year 2026		AM		IP		PM		Comment
		NB	SB	NB	SB	NB	SB	
Domin	Time (s)	1201	2074	1040	864	1282	1437	On Exisiting SH1
Expressway Follows Rail (Option 3d - Consultation Version)	Time (s)	600	594	600	589	610	589	SH1 Express way
Expressway Avoids Future Town Centres (Option 4)	Time (s)	654	646	654	642	663	642	SH1 Express way

Forecast year 2026		AM		IP		PM		Comment
		NB	SB	NB	SB	NB	SB	
Domin	Time (mins)	20.02	34.57	17.33	14.40	21.37	23.95	On Exisiting SH1
Expressway Follows Rail (Option 3d - Consultation Version)	Time (mins)	10.00	9.90	10.00	9.82	10.17	9.82	SH1 Express way
	Change (mins)	*10.02*	*24.67*	*7.33*	*4.58*	*11.20*	*14.13*	
Expressway Avoids Future Town Centres (Option 4)	Time (mins)	10.90	10.77	10.90	10.70	11.05	10.70	SH1 Express way
	Change (mins)	*9.12*	*23.80*	*6.43*	*3.70*	*10.32*	*13.25*	

Josephine Draper

From: Eric Whitfield
Sent: Thursday, 21 January 2010 4:37 p.m.
To: Josephine Draper
Subject: FW: SH1 Kapiti Study Cost Estimates
Attachments: olvcbem.jpg; Memo Parameter Estimate R1_140509.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

From: Roger Burra [mailto:roger.burra@opus.co.nz]
Sent: Thursday, 14 May 2009 12:59 p.m.
To: Eric Whitfield
Cc: WAYNE.STEWART@OPUS.CO.NZ
Subject: SH1 Kapiti Study Cost Estimates

Hi Eric,

Attached is a memo documenting Opus cost estimates of relating to each potential stage for a SH1 Expressway predominantly following the western side of the NIMT railway. This estimate has been through a vigorous internal challenge process and subsequent checks by some of our very experienced cost estimating specialists.

If you have any queries relating to these estimates, please do not hesitate to get in touch.

Many thanks

Roger

From: Noelia Martinez [mailto:noelia.martinez@opus.co.nz]
Sent: Thursday, 14 May 2009 9:46 a.m.
To: 'Roger Burra'
Subject: Memo Parameter Estimate R1

Hi Roger

Please find attached pdf of Parameter Estimate summary and memo. Hard copy will follow in a few minutes.

Regards,
Noelia

Noelia Martinez
Graduate Roading Engineer

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TO	Roger Burra
COPY	Keith Atkinson, Gareth McKay
FROM	Noelia Martinez
DATE	12 May 2009
FILE	
SUBJECT	SH1 Strategy Study – Parameter Based Estimate R1

Roger,

We have undertaken a rough order of cost estimate for the alignment shown on the drawings you provided me on 02/03/09. With the level of detail provided and given that that the design is still very much in a preliminary form, we decided that a parameter based estimate would be best suited in this case.

1.0 Parameters

The parameters developed for this estimate are listed below and have been built up from a database compiled from past projects:

Parameter	Parameter Cost ($M)
Two lane rural road	**4.0** /km
Four lane rural road	**8.0** /km
Two lane urban road	**20.0** /km
Four lane urban road	**25.0** /km
Widening 2 lane to 4 lane, rural	**3.0** /km
Widening 2 lane to 4 lane, urban	**15.0** /km
Grade separated intersection	**15.0** per intersection
Two lane bridge	**4.5** each
Four lane bridge	**8.5** each
Double track rail re-alignment	**5** /km
Single track rail re-alignment	**3** /km

These parameters have been used to build up a physical works cost by measuring the length of road (from drawings) and multiplying that by the associated parameter rate.

2.0 Professional Services

The proposed professional services fee (I&R, D&PD and MSQA) has been taken to be 15% of the physical works cost.

3.0 Property Costs

Property costs have been estimated by using land values (rates) extracted from the land valuation component of the 2008 State Highway valuation and multiplying this rate by the measured area (from AutoCAD). The land values vary depending on the land use adjacent to the state highway. The measured area extends from the existing state highway designation to the toe of the earthworks footprint. An allowance has then been made to purchase additional land in areas where the remaining area of a parcel becomes unusable. This has been accounted for by multiplying the measured area by a factor representative of any additional land take required (i.e. more in urban cases). This methodology has been used to develop an indicative property purchase cost for each stage.

4.0 Stages A and B

Stages A and B cost estimates were completed by Maunsell in 2002.

While a detailed cost estimate of the physical works using the parameter based approach for stages A and B has not been undertaken as part of this study, we have made a quick assessment to give a quick indicative cost using the parameter approach. Our findings are presented below:

Description	Stage A	Stage B
Stage A and B (using Maunsell estimate escalated to March 2009 index)	$25.9M	$34.9
Stage A and B (Opus initial parameter based assessment)	$87M	$92.8M

As you can see, the initial assessment parameter based cost for stages A and B are significantly higher than the escalated Maunsell values. From initial inspection it appears the Maunsell estimates significantly underestimate the cost of work. I recommend we report the higher values for project funding / BCR calculations but I must stress that further work is required to refine the cost estimate for stages A and B.

Our initial assessment of property costs for stages A and B are comparative to the Maunsell estimate.

5.0 Estimate Summary

The estimate is indicative and should be used as a guide only (i.e. use with caution). The estimate results are as per attached spreadsheet.

6.0 Exclusions and Assumptions

The following is a list of exclusions and assumptions that should be noted with these figures:

1. We have used the cost index of March 2009.

2. No specific design has been undertaken for any aspects of the works. Therefore a parameter cost approach has been adopted. Parameter rates should be used with caution.

3. No information is available on existing services, but parameter costs include some allowance (based on previous projects)

4. The service road in Waikanae has been priced as a 2 lane urban road.

5. Paraparaumu interchange has been taken to be from Sta 8,300m to 7,400m as instructed by Roger.

6. WLR southern intersection has not been included in the price.

7. No plans were provided for stage L. Stage L has been assumed to be the provision of a 2 lane rural road from Emerald Glen Road to MacKays Crossing (inc property costs) and a short tie in length from Poplar Ave to the existing state highway.

8. The measured property purchase area is the earthworks footprint in both rural and urban cases. An allowance has been made for addition land purchase (see above).

9. The physical works cost for stages A and B have been quickly checked using the parameter based approach. The parameter based approach shows much higher costs than the initial Maunsell estimate and so the higher values have been reported. These values should be used with caution.

10. We have calculated a cost range per each stage based in a weighted average of cost percentages between property costs and physical works costs.

11. When given a total range for the estimate we have considered two options:

    a) The project is looked into as a whole
    b) The project is looked into as individual stages

    a) If the project is looked into as a whole, the cost range given uses a '95th%ile' at the higher end of the range. Therefore the range of the project as a whole is $540M-$780M.

    b) If the project is looked into as individual stages where there is a possibility of constructing each stage separately, the approach described in option a) has not been considered appropriate.

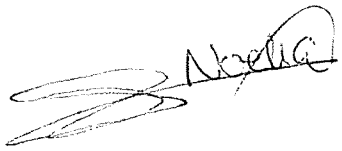
       We considered that if looking at each stage individually, fees costs should be redistributed to each stage.

Also, as the estimate is broken down into stages, the spread of the individual ranges needs to increase to reflect actual behaviour. The ranges are higher in comparison with the option a) approach because when looking into the estimate as a whole some "smoothing" was applied to allow for the "unders and overs" effect.

The estimate has been analysed in stages so that it is easy to compare cost ranges between them but if adding up the total costs for option b) approach the total range cost of the project is $540M-$990M for the reasons explained above.

I am happy to discuss further if necessary.

Regards



Noelia Martinez

Project Name SH1 Kapiti Strategy Study

Item	Description	Total		
		Optimist.	Expected Estimate ($M)	Pessimist.
A	**Stages Estimate Summary**			
	Stage A - (Otaki Bypass - by others)	94	111	178
	Stage B - (South of Otaki to WLR Northern Int - by others)	94	111	177
	Stage C - (WLR Northern Intersection)	15	18	25
	Stage D - (WLR Northern Intersection to Waikanae Interchange)	71	84	117
	Stage E - (Waikanae Interchange)	18	21	41
	Stage F - (Waikanae Interchange to Otaihanga Intersection)	49	58	87
	Stage G - (Otaihanga Intersection)	17	20	29
	Stage H2 - (Otaihanga Intersection to Paraparaumu Interchange)	41	48	77
	Stage I2 - (Paraparaumu Interchange)	47	55	105
	Stage J - (Paraparumu Interchange to WLR Southern Int)	81	96	134
	Stage K - (WLR Southern Intersection - not priced)	0	0	0
	Stage L - (WLR Southern Intersection to MacKays Crossing)	9	10	14
Total Project Estimate		**536**	**631**	**984**
	Say	**540**	**640**	**990**
	% of expected estimate	85%		156%
Spread Square Total				
Square Root				
95th%ile' Total				
	Say			
	% of expected estimate			
Expected Cost Range:		**540**	**640**	**990**
			Cost Index: March 2009	
Date of Estimate				**8/05/2009**
Estimate Prepared by			**Signed**	**NMARTINEZ**
Estimate Checked by			**Signed**	**GMCKAY**
Estimate internal peer review by			**Signed**	**KATKINSON**
Estimate approved by Client Project Manager			**Signed**	

Notes:

1 - This estimate is exclusive of escalation and GST

2- We have provided the '95th%ile' as the top value in the cost range as per the Hong Kong Method

Josephine Draper

From: Roger Burra [Roger.Burra@opus.co.nz]
Sent: Wednesday, 18 November 2009 3:52 p.m.
To: Josephine Draper
Subject: SH1 Expressway Options - Risk

Hi Jo,

I looked into the issue regarding risk earlier today. It didn't take as long as I had expected but this is the first opportunity that I have had to get back to you.

For the "follows rail option" the 95%ile estimate is 21% greater than the expected estimate. For the "WLR" and "Avoids town centres" options the 95%ile is about 33% greater than the expected estimate. On examination, the difference results from the risk applied to building an expressway on the WLR designation north of Te Moana Road. Very little investigation has been carried out for this part of the designation. On top of this, we know that the ground here is likely to be soft and marshy. A higher risk factor (90%) was therefore applied to the unit costs for this part of the expressway. The expected costs for this northern part of the WLR Expressway accounts for about 30% of the construction and property costs for each option. This means that the additional risk has a relatively large influence on the 95%ile for the full package.

Higher risk factors were also applied to some parts of the "follows rail" alignment, particularly in urban or constrained areas or where rail relocation is likely. Since the costs for these sections make up a smaller proportion of the total construction and property costs, the impact on the overall project risk is less.

We can provide 95%ile costs for the breakdown in the table, but you should be aware that the sum of the 95%iles for each section will be higher that the 95%ile for the full package.

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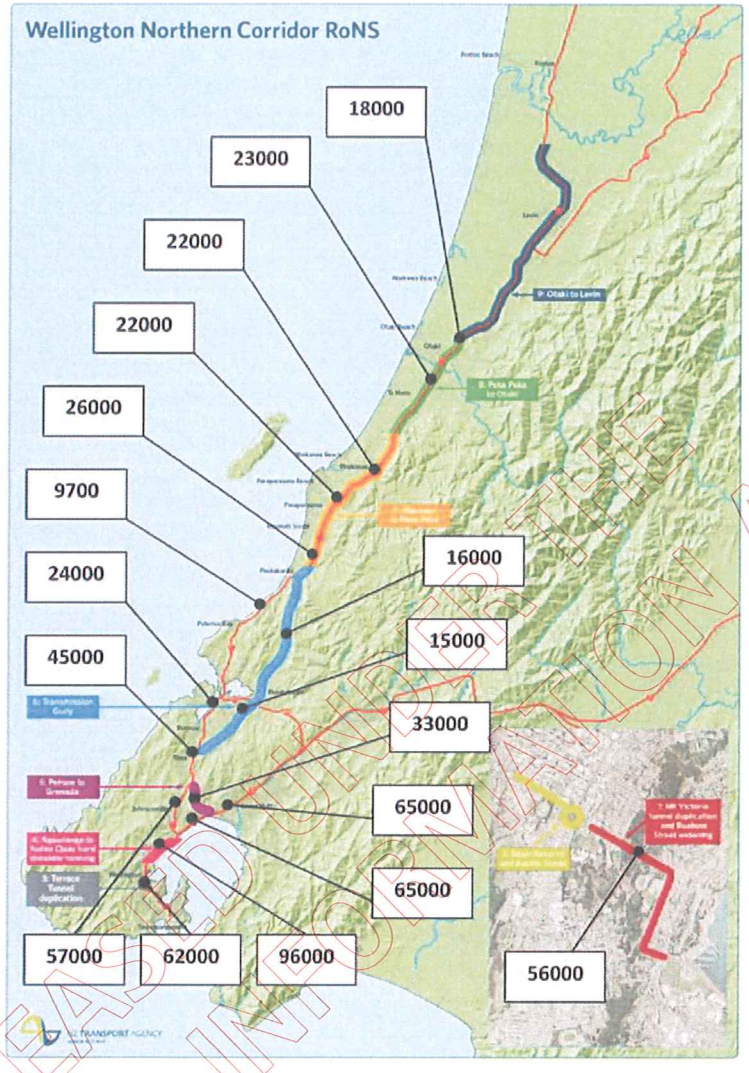


2026 Option (two-way AADT flows)
(Note: Flows in central Kapiti include trips on the expressway and the existing local road)

6.1.4 Freight road and rail

Using data from the National Freight Demands Study the pattern of road and rail traffic using the Cook Strait ferries in 2006-07 have been determined. This is set out in Table 6.1

Table 6.1
Cook Strait Ferry Movements 2006-07

Origin or Destination in North Island	Road		Rail	
	Million Tonnes	Per cent of total	Million Tonnes	Per cent of total
Upper North Island (Northland, Auckland, Waikato, Bay of Plenty, Gisborne)	1.4	62%	0.8	74%
Lower North Island (Taranaki, Hawkes Bay, Manawatu-Wanganui)	0.6	24%	0.2	20%
Wellington	0.3	14%	0.1	6%
Total	**2.3**		**1.1**	

The majority of movements on the ferry are from the Upper North Island, particularly for rail movements. For the Lower North Island the movements are dominated by flows to or from Manawatu for both road and rail and movements to or from Taranaki and Hawkes Bay are small.

Within the South Island the main origin and destination for movements, particularly for rail is the Canterbury Region. Other movements are relatively small.

In the Greater Wellington Region, traffic growth is closely correlated with economic growth and in particular heavy commercial vehicles (HCVs) volumes will grow faster than economic growth. For example, the 2.6% per annum growth in regional GDP experienced in 2008 was shown to deliver a growth in heavy commercial vehicles volumes in excess of 3.9% per annum. The Wellington Transport Strategic Model (WTSM) forecasts an underlying growth in the Region of 4.25% per annum between 2006 and 2026 (based on medium growth projections).

General traffic growth is a function of car ownership. Over the period 2003 to 2007 the "light vehicle" registrations in the Wellington Region increased by 2.6% per annum and "heavy vehicle" registrations increased by 4.4% per annum. Forecasts of traffic growth in the region show that in 2026 the traffic volumes along the SH1 corridor will grow by up to 2% p.a.

6.2 Wider economic benefits

6.2.1 Introduction

The conventional economic evaluation of the impacts of transport schemes is primarily focussed on changes in travel conditions for journeys that would be made whether or not the new facility is constructed, and therefore on the assumption that patterns of economic activity and land uses do not change. It is on this basis that the estimates of journey time savings, vehicle operating cost savings, accident savings and any environmental impacts which make up the main components of the appraisal are based. A wide range of evidence however suggests that the provision of new transport facilities can have a major impact on levels of economic activity and land uses. This is for example recognised in the recent NZ Treasury publication "Infrastructure Facts and Issues : Towards the First National Infrastructure Plan" September 2009 which states:-

> *Major transport projects of this type have a significant impact on the location and form of economic activity - they tend to shape urban development rather than follow it. For example, a third harbour crossing would likely lead to more development of the suburbs north of the harbour (in a similar manner to the growth facilitated by the existing bridge) while a CBD rail tunnel would likely result in greater intensification of the inner city, suburbs and town centres that lie along the rail network, e.g. New Lynn. Strategic decisions of this kind can lock in patterns of growth for many decades, whether good or bad.*

While this quotes two examples, there are very large numbers of other instances where the provision of transport facilities and accessibility has had an impact on employment and levels of activity. Evidence albeit limited from overseas suggests that this is not just an urban phenomenon, but that improvements in regional transport links can give rise to wider economic benefits over longer corridors. Historically development within the Wellington region was influenced by the provision of the railway which permitted and encouraged development at a number of locations including much of the Kapiti Coast. In particular by improving the transport linkages between activities in different areas, this allows these to be better integrated and open up

wider markets, allowing them to operate more efficiently resulting in productivity and output gains.

While there are a number of potential impacts, two of the major components of the Wider Economic Benefits are agglomeration impacts and wider employment impacts. Agglomeration impacts are broadly associated with productivity increases and the employment effects with growth.

These estimates of the wider economic benefits can usefully be considered against the general patterns of economic activity including employment and freight patterns within the potential area of influence of the RoNS. For the purpose of this analysis, this area is taken to be:-

Palmerston North.
Manawatu
Horowhenua
Kapiti Coast
Porirua
Hutt
Wellington City

6.2.2 Patterns of regional development

At a regional level, the upgrading of the RoNS will provide better connections between the Manawatu-Wanganui region and the Greater Wellington region with its international port and airport. Manawatu-Wanganui is a relatively poor region in terms of a number of economic indicators which display significant differences to the position in the Wellington region.

The position in terms of per capita incomes (total wage earnings divided by the population aged over 15) is set out in Table 6.2.

Table 6.2
Average Earnings by Area 2006

Area	Population aged over 15 in 2006	Average earnings per capita 2006 ($ pa)	Per cent of New Zealand average
Palmerston North City	60,213	28900	93%
Manawatu	21,756	29400	95%
Horowhenua District	23,523	24300	78%
Manawatu Wanganui Region	**173,838**	**27400**	88%
Kapiti Coast District	37,257	30800	99%
Porirua City	35,814	33200	107%
Hutt City	75,354	33200	107%
Wellington City	147,690	40300	130%
Greater Wellington Region	**356,496**	**35400**	114%
New Zealand Average	**3,160,371**	**31100**	100%

While the cities and districts along the RoNS within the Wellington region all have per capita incomes at or above the averages for the country as a whole, those within Manawatu are all below the national averages. Within the Wellington region itself, it is also noticeable that the earnings for the relatively more remote Kapiti Coast are below the other cities within the area of influence of the route.

An alternative measure is average household income and this is set out in Figure 6.1.

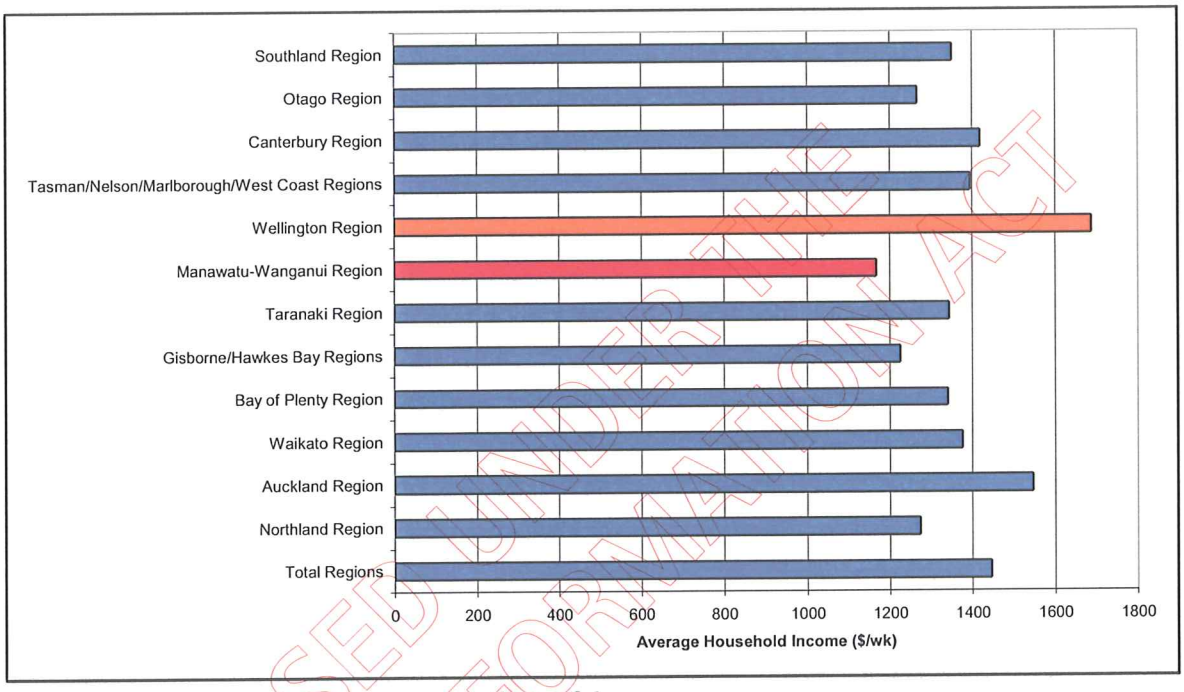


Figure 6.1
Average Household Incomes by Region 2007

This demonstrates fairly starkly the differences in household incomes between Manawatu-Wanganui, the poorest of the regional groups identified and Greater Wellington, the richest of the regions.

Differences in the make-up of employment can result in variations in economic development levels. The differences in employment by industry are set out in Figure 6.2

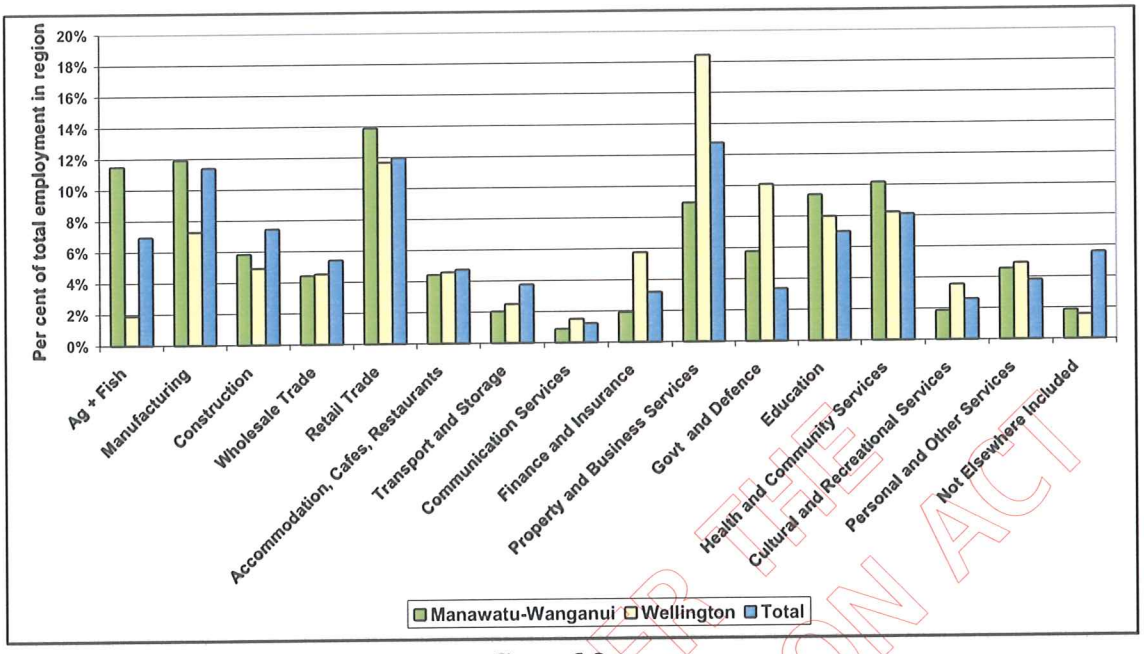


Figure 6.2
Employment by Industry 2006

Compared to the national position, Manawatu-Wanganui has a relatively high level of employment in agriculture, which has typically been slow growing and relatively low proportions of employment in the rapidly growing sectors of finance and business services. The high proportion of employment in agriculture also highlights the importance of links to the markets for the output of this sector, particularly for overseas markets potentially accessed via the port and to a lesser extent via the airport at Wellington.

For the Wellington Region there are relatively high proportions of employment in the finance and insurance, property and business services and government sectors. These are all activities which are people focussed rather than commodity focussed and which therefore benefit particularly from high levels of accessibility. (This is supported by the relatively high agglomeration elasticities identified for the first two groups and included in the EEM). For these a high level of accessibility to and within the urban area is important. These are also potentially activities for which access to the airport is important either for workers themselves or for visitors to their places of employment.

6.2.3 Patterns of Recent Employment Growth

Growth in employment in the local authority areas served by the road between 2001 and 2006 is set out in Table 6.3.

Table 6.3
Wellington Northern Corridor Area of Influence : Growth in Employment by Workplace 2001-2006

Area	Employment		Growth to 2006	
	2001	2006	Percent	Number
Palmerston North	33,798	38,100	12.7%	4,302
Manawatu	8,862	9,285	4.8%	423
Horowhenua	9,084	9,321	2.6%	237
Kapiti Coast	10,770	11,901	10.5%	1,131
Porirua	11,514	12,765	10.9%	1,251
Hutt	35,514	36,930	4.0%	1,416
Wellington City	100,539	111,660	11.1%	11,121
Total	210,081	229,962	9.5%	19,881

Over the five years from 2001 to 2006, employment in the corridor has increased by about 10 per cent or by about 4,000 jobs per year. Most the growth has been in the two main cities at the ends of the route, Wellington and Palmerston North, with a particular focus in Wellington, where employment has increased by over 11,000 or 11 per cent over the period.

For the local authorities in the area of influence of the route in the Greater Wellington Region, the medium growth forecasts by the Regional Council included in the traffic modelling suggest that employment will increase by about 44,000 or 22 per cent between 2006 and 2026. This has been used as the main basis for the transport modelling and forecasting of agglomeration impacts. While still demonstrating substantial growth this represents a rather slower rate of growth than has been observed historically and so this and the forecasts which are based on this may be conservative.

6.2.4 Anticipated Development

The regional planning background is set out in the Wellington Regional Policy Statement and the key identified growth areas are set out in Figure 6.3

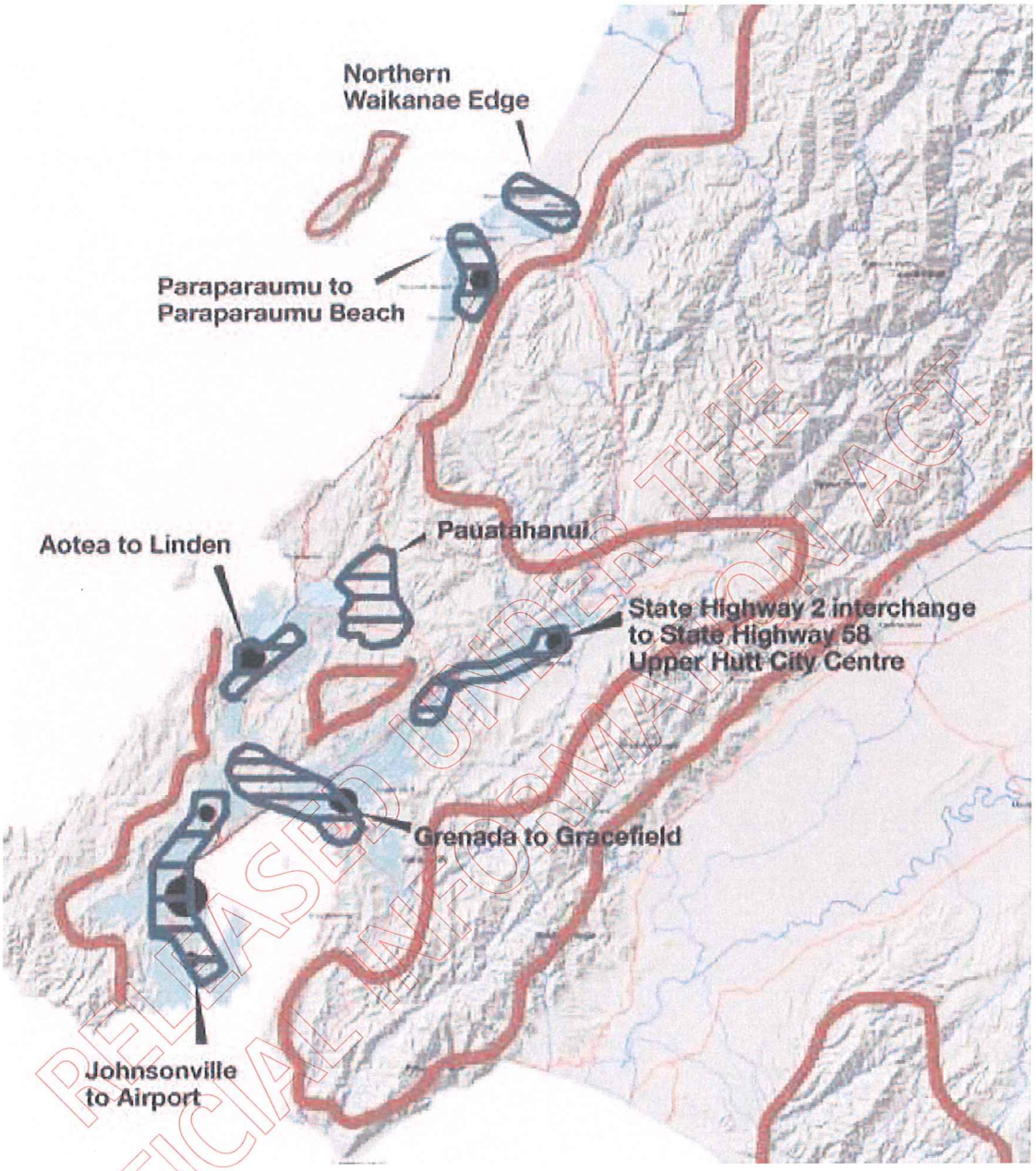


Figure 6.3
Growth areas as identified in the Wellington Regional Growth Strategy

Within the framework set out in the Wellington Regional Growth Strategy and as noted above in Section 4, the area served by the new route connects a number of identified development areas identified in the local and regional growth strategies. These include:-

Wellington City

- Miramar
- Kilbirnie
- Adelaide Road
- CBD
- Johnsonville
- Grenada North/Lincolnshire Park

Porirua City

CBD
Aotea Business Park
Pauatahanui/Judgeford

Kapiti Coast

Paraparaumu Town Centre
Paraparaumu Airport
Waikanae

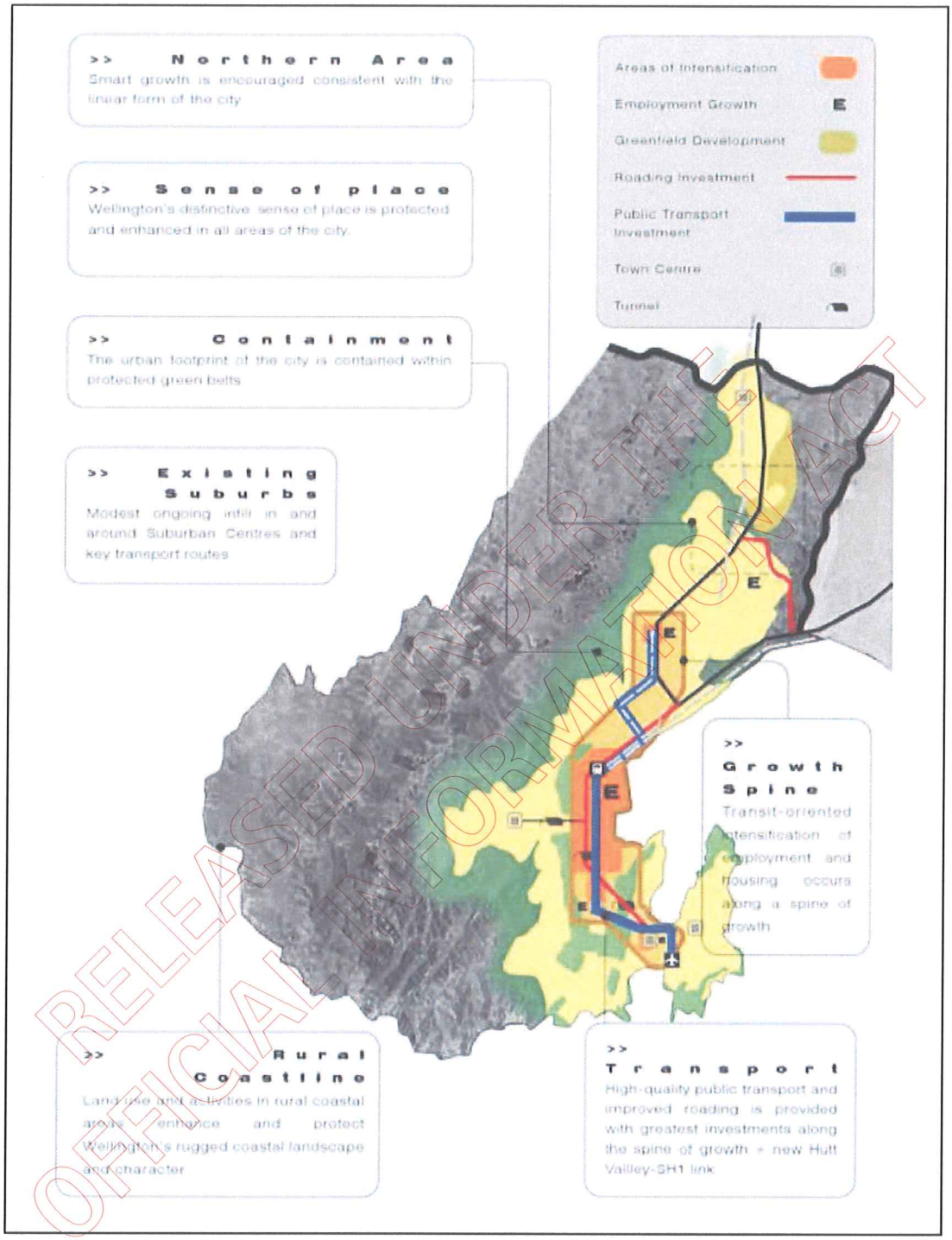
Horowhenua

Tararua Growth Area, Levin

There are also smaller scale plans to encourage limited development at the local centres along the route particularly in Kapiti Coast and Horowhenua. Further north in Palmerston North, the bulk of development is either anticipated in the CBD or north of the city in Manawatu District.

The proposals for the Wellington Region call for improved capacity on the main SH1/Western Corridor spine supported by links between SH2 and SH1 which would provide a more direct connection between Porirua and Hutt City avoiding the congested sections of SH1 and SH2 north of Ngauranga. The improved capacity on the road network would be supported by enhancements to public transport, particularly the rail services north of the city providing a balance within the corridors and ensuring that additional highway capacity would be available for the freight movements for which the switch to alternative modes would be more difficult.

Within Wellington City, the **Miramar** area to the east of the airport has become an important centre for the creative arts and in recognition of this is locally known as "Wellywood". In the Miramar North CAU, employment in "Motion Picture, Radio and Television Services" accounts for about a quarter of the 1300 jobs in this zone. Although the area does benefit from good links to the airport, development here is however considered to be constrained by the poor road connections with the CBD and areas further north, and employment growth over the period from 2001 to 2006 has been fairly limited at about 3 percent, well below the average for Wellington City as a whole.**Kilbirnie, Adelaide Road, the CBD** and **Johnsonville** are designated growth areas. The CBD and are located along the growth spine identified for the region, as set out in Figure 6.4



Source : Wellington City

Figure 6.4
The Wellington City Growth Spine

To the north of the city, Lincolnshire Farm provides the opportunity for greenfield expansion and would be well located in relation to the main SH1 corridor and also the proposed Petone-Grenada link. It is anticipated that future development for employment would occupy up to about 50 ha, with possible employment of up to 3000 at a density of 60 per ha.

In Porirua City, the main commercial development sites are in the CBD, the Aotea Block office park and possible longer term expansion at Pauatahanui/Judgeford at the junction between the new SH1 route and SH58.

In **Kapiti Coast District**, the main development areas are in Paraparaumu although the ways in which these might interact with and take advantage of the opportunities offered by any upgrading of the corridor in the area could be significantly affected by the design of the road. The constraints imposed by the capacity of the current traffic network have been recognised in the proposals for the development of the airport. Only about 106,000 sqm of development has currently been permitted with possible employment of about 1,500 with the balance of the development of about 230,000 sqm (with probably about 3000-3500 new jobs) only actioned when the transport network within the area has been upgraded.

Identified development proposals further north tend to be relatively small scale, reflecting the smaller populations and markets which they might serve. These include possible proposals for expansion at Waikanae and in **Horowhenua District** at Levin.

The provision of the Petone-Grenada link would also have impacts on **Hutt City**, both by providing a more direct link to Porirua and by diverting some of the traffic off SH2 between Petone and Ngauranga improving the connections to Wellington City. Given the nature of activity in Hutt City this was considered to mainly have an impact through the retention of existing industries and employment, rather than the creation of new employment opportunities over and above those in existence currently and the effects would therefore tend to be more dispersed. It would however help to support the area as the key industrial location within the region, providing a balance with the different types of activities located in other areas.

6.2.5 Freight Issues

Road and rail links exist within the Wellington RoNS corridor with the North Island Main Trunk line broadly paralleling SH1 for much of its length. The northern parts of the line are used mainly for freight with just two passengers services per day, the Capital Connection to Palmerston North and the Overlander providing a connection to Auckland. South of Waikanae there are increasing numbers of rail passenger services operated as part of the Wellington Region Metlink services, which may limit the capacity that is available for freight.

For freight, the North Island main trunk line provides the main connection between the upper and Central North Island and the Wellington Region itself and the South Island. Rail flows across the regional boundary in 2006-07 amounted to about 1.5 million tonnes, representing about 20 per cent of the total land based freight flows (ie excluding coastal shipping mainly of cement and petroleum products) into and out of the region. (Road and rail traffic on the Cook Strait ferries is classed for these purposes as land based). The main commodities carried by rail are manufactured and retail goods which account for over half the total with logs and other forest products accounting for about 15 per cent of the total and significant shares for other primary products including horticultural products, mainly from Canterbury to Manawatu, meat and dairy products. It is estimated that the capacity utilisation on the NIMT is about 50 per cent[1] indicating that this does not act as a constraint on the level of freight moved.

[1] "Coastal Shipping and Freight Modal Choice", Rockpoint Corporate Finance in association with Richard Paling Consulting and IPC and Associates NZTA 2009

The road freight movements along SH1 are substantial increasing southwards from about 1400 heavy vehicles AADT at the regional boundary to about 1500 at Paekakariki and about 3,000 in between Ngauranga and Aotea Quay after the merge of SH1 and SH2 in Ngauranga. Between the CBD and the airport, flows are lower at about 1700 south of Evans Bay Parade.

Information is also available on the volumes of inter-regional road traffic from the National Freight Demands Study and this is set out in 6.4

Table 6.4
Estimated Breakdown of Longer Distance Freight Flows across the Wellington/Manawatu-Wanganui Regional Boundary by Commodity

Commodity	Flows in 2006-07 in million tonnes pa
Liquid Milk and Dairy Products	0.26
Meat	0.05
Horticultural products	0.64
Logs and timber products	1.12
Coal	0.04
Aluminium and Steel	0.07
Chemicals, Fertiliser and Minerals	0.42
Retail and Courier	1.18
Aggregates	NA
Petroleum	0.11
Total Identified	**3.9**
Other flows not identified	**2.9**
Total Estimated Flow all commodities	**6.8**

Source National Freight Demands Study

The total inter-regional flow including commodities not identified in detail is estimated from the data in the NFDS at about 6.8 million tonnes. While this covers both SH1 and SH2, it is likely that with the exception of logging traffic, the majority of the freight traffic uses SH1 and this is reflected on the much lower heavy vehicle flows on this route (200-300 per day).

The main freight commodities handled by the longer distance traffic on the route fall into three main groups:-

- *Commodities transported from producers north of the Wellington region or in the northern parts of the Wellington Region* to the port of Wellington for export or to consumers and manufacturers in the main urban areas in the Region.
- *Commodities transported northwards* from the port or alternatively manufacturers or producers in the Wellington area for industry and consumers further north.
- *Retail and consumer products* either distributed from the main distribution centres and manufacturing plants in Auckland or from subsidiary distribution centres in Palmerston North for delivery in Wellington, or from distribution centres in Wellington for delivery further north. The route also provides the connection between Auckland and the main

centres in the South Island. Although much of this longer distance traffic is shared with rail and coastal shipping, the advantages that road can offer in terms of transit times, reliability and flexibility means that despite higher costs, it still retains a significant part of this longer distance market and this position is expected to continue in the future.

The longer distance road movements on SH1 through the Wellington Region between areas to the north and the South Island were estimated to be about 2 million tonnes in 2006-07. The balance of the longer distance inter-regional traffic on the road of just over 4 million tonnes represents more local movements to or from the Wellington region itself, showing that the route is important both for longer distance and shorter-distance inter-regional movements.

The NFDS has also made forecasts of the likely growth of longer distance freight traffic and this is set out in Figures 6.5 and 6.6

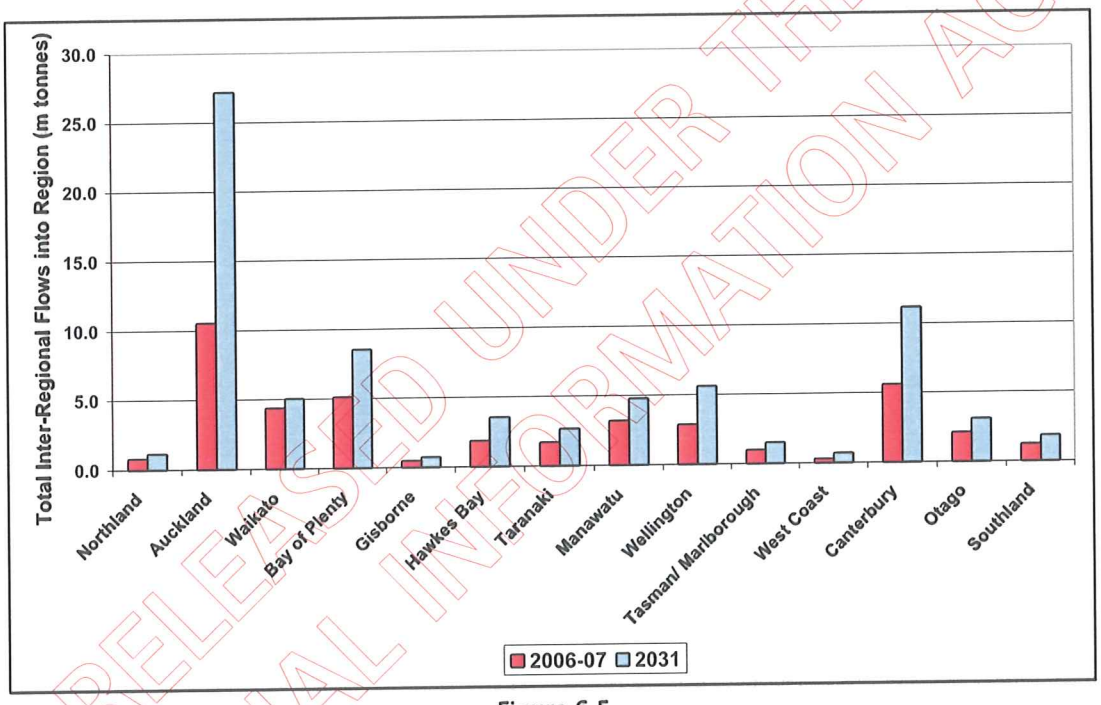


Figure 6.5
Growth of Inter-Regional Freight Traffic into Regions : 2006-07 to 2031 (million tonnes pa)

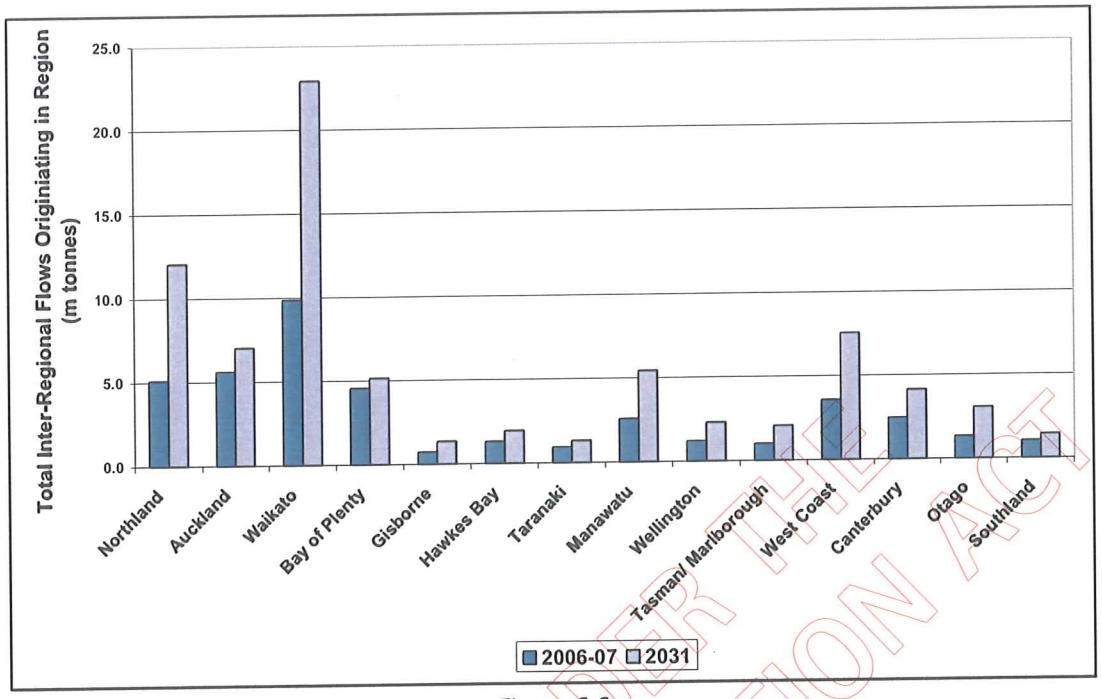


Figure 6.6

Growth of Inter-Regional Freight Traffic from Regions : 2006-07 to 2031 (million tonnes pa)

Freight traffic into the Wellington region is forecast to increase fairly substantially driven to a significant extent by the growth of forest products. Outbound freight flows are forecast to increase more modestly.

6.3 Improved Connections to areas of economic growth potential

Section 6.2.4 has identified the key economic growth areas within the corridor which would be potentially affected by the implementation of the Wellington-Levin RoNS. In particular, these include the centres of Wellington City, Porirua City and Paraparaumu and a number of potential new and expanding employment areas along a line from Miramar to Levin. Given the nature of the activities proposed for these areas and the constraints imposed by the present transport network, it is likely that there will be significant impacts on employment levels within the corridor. These are considered further and some quantification undertaken in Section 6.8

There is no readily available data on the growth of distribution centres in Palmerston North. However looking through the results of the interviews undertaken as part of the NFDS and the Rockpoint Coastal Shipping Study it seems that while distribution centres are located in both Palmerston North and Wellington (although not normally for the same product) there are a number of large distribution centres in Palmerston North including Progressive, Ezibuy, and DB. Those in Wellington tend to be smaller and more product specific (eg Bridgestone Tyres). A number of the major transport companies also have small facilities in Wellington including Linfox and PBT (who have private sidings).

The potential for new distribution centres was considered. At one time, this had seemed a potential idea for Lower Hutt, particularly in the Seaview area where space was potentially available. However subsequent discussions with Hutt City on my visit last month where this was raised specifically indicated that this no longer seemed to be a live option.

6.4 Increasing access to markets

6.4.1 Agriculture

The main agricultural products mainly produced or processed in the area and transported in the corridor and which are therefore likely to be affected by the upgrading of SH1 are:-

- Forest products
- Meat
- Horticultural products
- Dairy Products

Improved access to and from the port would be important for all of these and in particular, Wellington port handles high volumes of the logs and timber products produced in Manawatu.

Forest Products
The Regional Policy Statement notes that "The potential for forestry is only partially tapped. An emerging industry in further processing is developing and this industry provides considerable environmental benefits through carbon sequestration, erosion control and bio fuels."

The output of the forestry industry is particularly important in the context of movements within the RoNS corridor. While this is large now, with total log production in Manawatu/Wanganui estimated at about 1.1 million tonnes in 2006-07, it is expected that this and output in the north of the Wellington region will grow strongly, by between 250 and 300 per cent by 2031 as existing forests mature and are harvested.

It is anticipated that a high proportion of this increased output would mainly be exported through Wellington and would either be in the form of logs or of value added timber products, including sawn timber and pulp and paper: linkages to the port are therefore clearly important. Better transport connections and in particular more reliable transit times will enhance the linkages to the more time-sensitive services used for the export of value added products. It is proposed that a significant portion of this traffic particularly of the less time-sensitive logs and woodchips will be handled by rail and NZTA has approved several ATR submissions to support this, resulting in the development of inland log ports at Marton and Masterton. However, because of the scale of the growth, it is also likely that road would have an important role particularly in the movements of the higher value products and improvements to the highway network and particularly its reliability would help to support these.

Unprocessed logs are a very low value product and the extent to which these are harvested and are competitive on international markets is very dependent on the costs of transport. While there may be the potential to divert some of this traffic to rail, the scale of the potential increase in production will mean that increasing volumes are likely to be transported by road.

The transport to the port only represents part of the total cost with fluctuations in shipping costs also playing a part. However the delivered cost to the port may represent 10 per cent of the total "fob" price for unprocessed logs, and a much larger part of the margin achieved. This traffic is therefore very sensitive to transport costs and reductions in costs may therefore have significant impacts on the returns achieved by exporters and may affect the volumes exported. This latter effect is not taken into account in the conventional economic appraisal.

In addition, the extent to which logs are converted into higher value added products may also be influenced by the costs and reliability of the transport network and supply chains handling these products. Discussions with representatives of the forestry industries and with the freight sector in general has demonstrated the importance of transport reliability, which may be particularly an issue for products heavily focussed on export markets and the need to meet relatively inflexible container shipping schedules. Because of the very substantial increase in the volumes of trees harvested, the proportion which would be exported as logs is forecast to grow substantially from about 20 per cent now to about 70 per cent by 2031. Based on information developed for the assessment of the Puhoi-Wellsford RoNS and which are considered relevant for the Wellington region , the values of unprocessed logs and value added products vary from about $200 per tonne for unprocessed logs to a typical value of $1200 per tonne for value-added products. To the extent that improvements to the transport linkages can increase the share of value added products by even a small proportion, this is likely to result in considerable changes in the value to New Zealand of the output of the sector.

Meat and dairy products

For meat and dairy products, the value of the product is higher and the effects of transport costs on the export price are therefore likely to be much lower. In addition, for these products there may be less opportunity to change the nature of the output, although problems with trip reliability may result in some changes in patterns of processing and distribution possibly to the disadvantage of the producing region. Given the relatively low incomes and level of economic development in Manawatu, this may have a more significant impact.

Horticultural Products

The main movements of horticultural products are for domestic consumption with large volumes of grain moving from the Canterbury region for processing in Manawatu. For other agricultural products, delays in reaching markets may however affect the potential demand for the product and may limit the returns that growers are able to achieve.

6.4.2 Retail and manufacturing

Within New Zealand, a common distribution pattern for manufactured or retail goods is for these either to be imported into Auckland or manufactured there, and then subsequently distributed to points further south. This would either be direct to customers for those close to Auckland or for urgent deliveries, or via subsidiary distribution centres in the lower North Island or South Island for onward transport for longer distance and less-urgent movements. There is also a similar but smaller movement for goods originating in the South Island typically from the Christchurch area and distributed either directly to customers or to distribution centres typically in Auckland.

Much of the freight using both road and rail networks consists of manufactured and retail commodities and the corridor provides an important component of the supply chains linking the upper North Island with Wellington and the South Island in line with the framework described above.

With the development of more sophisticated supply chains and the reduction of inventories in retail stores, an increasing premium is being placed on delivery within constrained time windows. Any unreliability in travel times can therefore result either in deliveries missing their designated delivery slots or transport companies scheduling journeys with a degree of slack in the timing,

thus reducing the efficiency of the operation. While these improved supply chains can reduce costs if they are working well, they are vulnerable to unreliability resulting in increased costs. Reducing unreliability and also transit times in general will allow better use to be made of transport assets and can result in more efficient supply chains. Improving the links between the growing distribution activities at Palmerston North and the Wellington region would be an important component of this.

Improvements in the links between manufacturers and their suppliers will also allow suppliers to compete over wider areas, including in some instances international markets and may therefore allow them to expand output and employment.

6.4.3 Tourism

Tourism is an important activity within the RoNS corridor with substantial numbers of tourist nights being spent in the Wellington, Kapiti Horowhenua and Manawatu Regional Tourist Organisation (RTO) areas. Within the Wellington region as a whole tourism is estimated to account for 10 per cent of regional domestic product or about $1.4 billion per year.

The position for 2008 is set out in Table 6.5 in terms of tourist visits and in Table 6.6 in terms of estimated direct expenditure by domestic and international visitors.

Table 6.5 Tourist Nights by RTO 2008		
Destination	**Number of nights**	**Per cent of total**
Auckland RTO	24.0	24%
Canterbury RTO	10.6	10%
Wellington RTO	**8.0**	**8%**
Northland RTO	5.7	6%
Waikato RTO	4.6	5%
Nelson RTO	3.7	4%
Bay of Plenty RTO	3.7	4%
Coromandel RTO	3.6	4%
Queenstown RTO	3.6	3%
Hawke's Bay RTO	3.4	3%
Rotorua RTO	3.3	3%
Lake Taupo RTO	3.3	3%
Dunedin RTO	2.6	3%
West Coast RTO	2.4	2%
Manawatu RTO	**2.2**	**2%**
Marlborough RTO	2.0	2%
Taranaki RTO	1.9	2%
Southland RTO	1.4	1%
Eastland RTO	1.4	1%
Lake Wanaka RTO	1.4	1%
Kapiti-Horowhenua RTO	**1.0**	**1%**
Kawerau-Whakatane	1.0	1%
Fiordland RTO	1.0	1%
Ruapehu RTO	1.0	1%
Wairarapa RTO	0.9	1%
Central Otago RTO	0.8	1%
Wanganui RTO	0.7	1%
Central South Island RTO	0.7	1%
Mackenzie RTO	0.7	1%
Hurunui RTO	0.6	1%
Waitaki RTO	0.6	1%
Clutha	0.2	0%
Total	**102.0**	**100%**

Source : Ministry of Tourism website

The Wellington region accounts for about 8 per cent of tourist nights spent in New Zealand in 2008 with Manawatu accounting for 2 per cent and Kapiti-Horowhenua for about 1%.

Information is on tourist expenditure is set out in Table 6.6

Table 6.6
Total Estimated Tourist Expenditures by RTO Year Ending June 2008 ($millions)

RTO	International Tourists	Domestic Tourists	Total
Northland RTO	7	308	314
Auckland RTO	274	793	1,068
Coromandel RTO	15	212	227
Waikato RTO	12	389	401
Bay of Plenty RTO	1	299	300
Rotorua RTO	10	220	230
Lake Taupo RTO	3	181	184
Eastland RTO	4	95	100
Ruapehu RTO	1	58	59
Taranaki RTO	1	97	98
Wanganui RTO	0	43	43
Manawatu RTO	**12**	**176**	**188**
Kapiti-Horowhenua RTO	**7**	**106**	**113**
Wellington RTO	**41**	**361**	**402**
Wairarapa RTO	3	70	73
Marlborough RTO	4	75	79
Nelson RTO	9	135	144
Hurunui RTO	0	55	55
Canterbury RTO	103	529	632
West Coast RTO	3	56	60
Central South Island RTO	0	61	61
Mackenzie RTO	1	27	28
Waitaki RTO	0	33	34
Lake Wanaka RTO	1	49	49
Central Otago RTO	3	58	61
Queenstown RTO	20	123	143
Dunedin RTO	42	120	161
Clutha	0	29	29
Fiordland RTO	1	33	35
Southland RTO	2	63	65
Kawerau-Whakatane	0	64	64
Hawke's Bay RTO	7	168	174
Total	**588**	**5,086**	**5,674**

Expenditure by tourists in the year ending June 2008 in the three RTOs within the broad area of influence of the RoNS amounted to about $0.7 billions, with about 55 per cent of this being spent in the Wellington RTO area, 15 per cent in Kapiti and about 30 per cent in Manawatu. While the shares for the remoter areas of Kapiti and Manawatu are lower, these are important to parts of the local economies

Information is also available on the origins of tourists. This is summarised in Table 6.7 for visits and Table 6.8 for the nights spent.

Table 6.7
Tourist Visits to the Wellington, Kapiti and Manawatu RTO Areas 2008 (000s)

Origin of Tourists	Wellington	Kapiti	Manawatu
Wellington	1.05	1.17	741
Manawatu	0.67	0.50	1180
Other NZ	1.49	0.17	773
Overseas	0.79	0.08	126
Total	4.00	1.92	2820

Table 6.8
Tourist Nights in the Wellington, Kapiti and Manawatu RTO Areas 2008 (millions)

Origin of Tourists	Wellington	Kapiti	Manawatu
Wellington	0.21	0.33	0.41
Manawatu	0.44	0.09	0.15
Other NZ	2.91	0.41	1.01
Overseas	4.46	0.19	0.67
Total	8.02	1.01	2.24

Tourist visits are very much dominated by shorter distance movements with 85-90 per cent of visits to Kapiti coming from Wellington or Manawatu. For these shorter distance journeys especially for shorter duration day and overnight visits, the quality of the road network and the ability to make journeys reasonably quickly and reliably may be an important factor supporting and encouraging tourist activities in the area. While equivalent data is not available for the Wellington area, the data for Northland suggests that road improvements can have a discernable impact on levels of tourist activity.

In terms of the nights spent by visitors, international visitors account for about half the Wellington total, reflecting its importance as the centre of Government and as a gateway to New Zealand through the airport. For the other RTOs, the proportion of international visitors is much smaller, and these are much more dependent on the domestic market, with visitors from Wellington representing a key part of this.

6.5 Improvements to journey time reliability

Journey time reliability is typically an important component in the development of freight patterns and effective supply chains, and poor reliability may act to hinder patterns of economic development especially in more remote areas and the development of more efficient supply chains. The proposals for the route would provide particular improvements by reducing the bottlenecks arising from specific constraints within the urban area, including Mount Victoria Tunnel, Basin Reserve and Terrace Tunnel, along SH1 and SH2 near Ngauranga by providing the Petone-Grenada link (which would provide a bypass for particularly congested sections of the SH network). It would also ease the constraints arising along the coastal section of SH1 which is particularly vulnerable to accidents and slips.

An inland route would also improve network resilience by providing two alternative routes into Wellington from the north west. This would reduce the risk of total road closure following accidents, slips or flooding, especially on the coastal section of route. This coastal section of

route may also be more vulnerable to extreme weather conditions arising as the result of global warming.

6.6 Easing of severe congestion

The existing Wellington RoNS corridor between the Airport and Levin varies significantly in terms of congestion. With congestion occurring through much of the weekday and weekend daytime period between the Airport and the Terrace Tunnel, while north of this point it is characterised by peak periods, weekend, and holiday period congestion. In addition these key periods, the lack of route choice results in significant congestion as a result of incidents, crashes or natural disasters.

Projects to the north of Linden are not generally the subject of link congestion as traffic volumes reduce the further north you head, however they are subject to severe congestion at locations in which local traffic and land use interact with strategic through traffic, such as Mana, Pukerua Bay, Paekakariki, Paraparaumu, Waikanae, Otaki and Levin. Much of this congestion is caused by at grade intersections, competing demands and access arrangement, variability in traffic demand, interactions with other modes such as at grade rail and pedestrian crossings.

The Wellington RoNS projects seek to remove and/or reduce the congestion for strategic trips and freight as a priority. This is demonstrated through the predicted journey time savings from the construction of the RoNS projects along SH1 between the Airport and Levin. The predicted 2026 journey time savings have been calculated using a combination of the WTSM model (owned and managed by GWRC) and individual project calculations north of MacKays crossing due to the poor definition of the RoNS projects north of MacKays crossing in the WTSM model.

The table at Annex 1 shows a comparison between the predicted 2026 journey times over each peak period for 2026 do-minimum and RoNS project.

There are significant journey time savings that can be realised should the RoNS projects be constructed from the Airport to Levin. On average, travel time savings of 34 min in the AM peak southbound and 29 min in the PM peak northbound is predicted by 2026. The largest proportion of journey time savings across the entire route occurs from the construction of the SH1 expressway between MacKays Crossing and Peka Peka.

It should be noted that the RoNS package also provides significant congestion relief for other strategic routes and local road connections which have not been identified in this assessment, key links include; Evans Bay Parade and other key arterial roads through the Wellington CBD, the Old Hutt Road, SH2 between Ngauranga and Haywards, SH58, Kapiti local road network through the associated complementary WL projects and final local trips in Otaki and Levin.

6.7 Improving transport efficiency

The improvements to journey time reliability and easing of severe congestion identified above would permit improved transport efficiency with shorter travel times and improved journey time reliability. These improvements to the key corridor connecting Wellington to the Kapiti Coast and points further north combined the Petone - Grenada link would enhance the connections between the three main urban areas within the region and would provide better inter-regional connections for passengers and freight. In particular the traffic modelling has indicated that regular travel time savings of about half an hour over the route as whole or about 20-25 per cent. For business

travel and freight movements, time savings of this magnitude, coupled with increased travel time reliability would be valuable and support more efficient distribution activities.

The ways in which transport efficiency would be improved in terms of overall journey time savings and vehicle operating cost benefits and other savings are set out in more detail in Section 6.9.

6.8 Alternatives and Options

The RoNS elements were the results of strategic studies and corridor plans (as discussed in section 5.2). The Western Corridor Study, Ngauranga to Airport Strategic Study, and the Ngauranga Triangle Strategic Studies were multi-modal studies that considered a wide range of transport needs. All growth assumptions were consistent with the *Wellington Regional Strategy* (the Wellington region's growth strategy).

In each of the studies, a range of multi-modal packages were developed and assessed in terms of their transport performance as well as how they met the objectives of the Land Transport Management Act. All of these studies recommended passenger transport upgrades which have been since adopted into corridor plans in the Wellington RLTS. However, all of the studies concluded that while passenger transport upgrades would benefit commuter routes and help lead to a balanced transport network, significant improvements were necessary to SH1 in order to improvement its safety and reliability. The SH1 elements proposed for the Wellington RoNS are the SH1 improvement components of the adopted corridor plans.

6.9 Quantifying the wider economic benefits

6.9.1 Introduction

The wider economic benefits of the Wellington-Levin RoNS have been estimated under two main headings, the agglomeration benefits and the wider economic benefits resulting from changes in employment in the corridor.

6.9.2 Agglomeration Impacts

The assessment of agglomeration impacts has been undertaken in line with the approach set out in the EEM for the schemes within the Wellington City urban area. The details of this have been reported separately and the results are currently under review by NZTA. The NPV of the benefits estimated amounts to $195 millions in 2008 prices discounted to 2008 at an 8 per cent discount rate. The benefits would represent an annual increase in the GDP of the Wellington City area of between about 0.1 per cent and 0.2 per cent.

It has been agreed that subject to review of the details of the method of calculation this sum can be included in the base economic evaluation of the project.

6.9.3 Employment Impacts

The procedures for estimating the employment effects of the RoNS and other wider economic benefits are less well established. Earlier work considering the RoNS as a whole used seprate approaches for inter-urban and urban sections of route. For the inter-urban sections an approach was developed based on the estimated impacts of new inter-urban road schemes overseas which was then applied to the conditions within the RoNS corridors. The overseas experience suggested that new roads could lead to a net increase in employment of about 0.4 per cent or more and this was used as the basis for estimating the potential impacts of the RoNS. The increases in employment which result are set out in Tables 6.9 and 6.10.

Table 6.9
Estimation of Employment Impacts : Foxton-Mackays Crossing

TAs in Area of Influence	Employment in Area of Influence 2006	Employment Generation Factors	Increase in Employment
Palmerston North	38,100	0.1%	
Manawatu	9,285	0.1%	
Horowhenua	9,321	0.2%	
Kapiti Coast	11,901	0.2%	
Porirua	12,765	0.1%	
Total	81,372	*(0.13%)*	103

Table 6.10
Estimation of Employment Impacts : Mackays Crossing-Wellington North

TAs in Area of Influence	Employment in Area of Influence 2006	Employment Generation Factors	Increase in Employment
Horowhenua	9,321	0.2%	
Kapiti Coast	11,901	0.2%	
Porirua	12,765	0.2%	
Hutt	36,930	0.2%	
Wellington	111,660	0.2%	
Total	182,577	*(0.2%)*	365

For the urban components of the route an approach was used which was linked to the estimates of agglomeration benefits. From this, it was estimated that this employment generation would amount to about 200 new jobs and would also result in the relocation of some jobs to locations which would become more productive .

The value of the impact on employment was assessed using estimates of GDP per worker which were consistent with those used to estimate the agglomeration benefits. It was assumed that these benefits would build up gradually over time and the overall benefits which result are estimated at about $331 millions.

Using this approach the total numbers of jobs estimated to be generated by the upgraded road and which would be new rather than relocated would amount to about 650. This can be compared with total employment in the area of influence of about 230,000 in 2006 and a growth of 20,000 over the 5 years from 2001 to 2006.

As an alternative approach, the planning background set out above has identified a number of development sites and opportunities along the route of the road which would potentially particularly benefit from the improved accessibility which would arise. The potential impacts for a selection of these have been assessed to give an alternative indication of at least some of the new employment and associated benefits which might be achieved with the new road.

The sites examined are:

Miramar

The Miramar area currently has employment of about 3250, but growth over the previous 5 years has been fairly limited at about 3 per cent, compared to growth in Wellington City as a whole of about 11 per cent. If the improved accessibility of the site with the RoNS was sufficient to allow growth at the Wellington City average, this would have resulted in additional employment of 240. Given the nature of the likely economic activity in the area with a strong focus on the creative arts serving international markets, it is likely this employment can be considered as additional rather than just relocated.

Lincolnshire Farm

Commercial and industrial development on 50 ha is proposed with the potential for about 3000 jobs. With the construction of the Grenada -Petone link this would have a much broader catchment area including Petone and other parts of Hutt City and would also be suited for a wider range of activities especially for distribution or other activities dependent on access to or from a wider area. In this instance, while it is not easy to quantify with any precision the impacts of the improved accessibility, the assumption of an increase in employment in the area of 8 per cent, in line with that made for Miramar would result in additional employment creation of about 240 jobs.

Paraparaumu Airport

For this, the transport constraints have been recognised in the consenting for the site, and the upgrading of the road network could result in the generation of some 3000 new jobs.

Following this approach, just three of the development sites in the corridor could potentially generate 3500 additional jobs. Even if half were relocated from elsewhere, the total would still be substantially higher than the forecasts based on the overall RoNS approach (0.4% net increase).

Other specific opportunities for employment creation lie in the tourism sector particularly in the Kapiti Coast and Horowhenua and there is also the potential for increased value of output in the forestry industry. These effects would again suggest that the forecasts using the RoNS approach are likely to be very conservative.

The analysis above allows comparisons to be made between the employment growth derived from the overall approach developed for the RoNS as a whole with:

- the possible impacts on a limited selection of development areas, where potential employment growth has been identified,
- the overall patterns of growth in the growth observed in the corridor over the last 5 years where the number of jobs has increased by almost 20,000 and

- the potential for increased productivity and growth in a number of areas, including tourism and the forestry industry, which could particularly benefit the poorer parts of the corridor.

On this basis, the increase of 650 in employment in the corridor and the estimated benefits of some $331 millions over the evaluation period appears fairly conservative.

6.9.4 Overall Assessment

On the basis of the analysis set out above the wider economic benefits from the Wellington-Levin RoNS could amount to a total of $526 millions NPV, made of $195 million for agglomeration benefits and $331 millions of other wider economic benefits, estimated on the basis of employment generation. [Both these figures are subject to review by NZTA]

6.10 Economic Assessment

6.10.1 Introduction

The overall BCR for the Wellington Northern Corridor RoNS project was calculated by combining the individual BCR's which were revised and recalculated to reflect the start and construction dates as per the proposed programme P7. This process involved extracting the annual benefits from each of the original individual project appraisals and re-adjusting the benefit streams to reflect the start and finish dates as per the proposed programme. This process also included interpolating/extrapolating the benefits for the intermediate years and with the assumption that the 30 year analysis period would start from the start of the construction of the last element of the RoNS package. It has also been assumed that the benefits for the RoNS sections completed prior to the start of the construction of the last element of RoNS package would be realised from their respective completion dates up to the end of the analysis period. A detailed report on the economic analysis for the overall RoNS project has been prepared by Opus International Consultants Ltd. (Please refer to Opus Report "Wellington Northern Corridor RoNS Economic Analysis", October 2009 as attached to the LTP on-line submission)

It should be noted that the overall BCR calculations for the Wellington RoNS project package has been reviewed by Peter Bradshaw at Beca. Peter has confirmed that BCR methodology is consistent with the strategic and combined nature and scale of the RoNS package. (Please refer to Becca Report "Wellington Region RoNS Economic Assessment Peer Review" as attached to the LTP on-line submission)

6.10.2 Transportation Modelling

Transportation modelling and assessment for the RoNS package has assumed that a number of key strategic transport projects and assumption have been made in the do minimum transportation model for the future, these include directly related projects such as Kapiti rail extension and duplication to Waikanae, network wide rail rolling stock improvements, bus priority projects for Wellington and a 5% reduction in private vehicle trips to and from Wellington CBD by 2016. These assumptions have been tested in WTSM in order to provide a realistic do minimum demand. The only changes between the do minimum and the option assessment are directly related to the RoNS projects and no other network improvements.